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National Occupational Analysis

2012 | Tower Crane Operator

Human Resources and Skills Development Canada
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Canada

Occupational Analyses Series

Tower Crane Operator

2012

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FOREWORD

The Canadian Council of Directors of Apprenticeship (CCDA) recognizes this National Occupational Analysis (NOA) as the national standard for the occupation of Tower Crane Operator.

Background

The first National Conference on Apprenticeship in Trades and Industries, held in Ottawa in 1952, recommended that the federal government be requested to cooperate with provincial and territorial apprenticeship committees and officials in preparing analyses of a number of skilled occupations. To this end, Human Resources and Skills Development Canada (HRSDC) sponsors a program, under the guidance of the CCDA, to develop a series of NOAs.

The NOAs have the following objectives:

- to describe and group the tasks performed by skilled workers;
- to identify which tasks are performed in every province and territory;
- to develop instruments for use in the preparation of Interprovincial Red Seal Examinations and curricula for training leading to the certification of skilled workers;
- to facilitate the mobility of apprentices and skilled workers in Canada; and,
- to supply employers, employees, associations, industries, training institutions and governments with analyses of occupations.

ACKNOWLEDGEMENTS

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This analysis was prepared by the Labour Market Integration Directorate of HRSDC. The coordinating, facilitating and processing of this analysis were undertaken by employees of the NOA development team of the Trades and Apprenticeship Division. The host jurisdiction of Ontario also participated in the development of this NOA.

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LIST OF PUBLISHED NATIONAL OCCUPATIONAL ANALYSES (Red Seal Trades)

TITLE	NOC* Code
Agricultural Equipment Technician (2007)	7312
Appliance Service Technician (2011)	7332
Automotive Painter (2009)	7322
Automotive Service Technician (2011)	7321
Baker (2011)	6252
Boilermaker (2008)	7262
Bricklayer (2011)	7281
Cabinetmaker (2007)	7272
Carpenter (2010)	7271
Concrete Finisher (2006)	7282
Construction Craft Worker (2009)	7611
Construction Electrician (2011)	7241
Cook (2011)	6242
Electrical Rewind Mechanic (1999)	7333
Floorcovering Installer (2012)	7295
Glazier (2008)	7292
Hairstylist (2011)	6271
Heavy Duty Equipment Technician (2009)	7312
Industrial Electrician (2011)	7242
Industrial Mechanic (Millwright) (2009)	7311
Instrumentation and Control Technician (2010)	2243
Insulator (Heat and Frost) (2007)	7293
Ironworker (Generalist) (2010)	7264
Ironworker (Reinforcing) (2010)	7264
Ironworker (Structural/Ornamental) (2010)	7264
Landscape Horticulturist (2010)	2225
Lather (Interior Systems Mechanic) (2007)	7284
Machinist (2010)	7231

*National Occupational Classification

TITLE	NOC* Code
Metal Fabricator (Fitter) (2008)	7263
Mobile Crane Operator (2009)	7371
Motorcycle Mechanic (2006)	7334
Motor Vehicle Body Repairer (Metal and Paint) (2010)	7322
Oil Heat Systems Technician (2006)	7331
Painter and Decorator (2011)	7294
Partsperson (2010)	1472
Plumber (2010)	7251
Powerline Technician (2009)	7244
Recreation Vehicle Service Technician (2006)	7383
Refrigeration and Air Conditioning Mechanic (2009)	7313
Rig Technician (2008)	8232
Roofer (2006)	7291
Sheet Metal Worker (2010)	7261
Sprinkler System Installer (2009)	7252
Steamfitter — Pipefitter (2010)	7252
Tilesetter (2010)	7283
Tool and Die Maker (2010)	7232
Tower Crane Operator (2012)	7371
Transport Trailer Technician (2008)	7321
Truck and Transport Mechanic (2010)	7321
Welder (2009)	7265

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Human Resources and Skills Development Canada
140 Promenade du Portage, Phase IV, 5th Floor
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These publications can be ordered or downloaded online at: www.red-seal.ca. Links to Essential Skills Profiles for some of these trades are also available on this website.

STRUCTURE OF ANALYSIS

To facilitate understanding of the occupation, the work performed by tradespersons is divided into the following categories:

Blocks	the largest division within the analysis that is comprised of a distinct set of trade activities
Tasks	distinct actions that describe the activities within a block
Sub-Tasks	distinct actions that describe the activities within a task
Key Competencies	activities that a person should be able to do in order to be called 'competent' in the trade

The analysis also provides the following information:

Trends	changes identified that impact or will impact the trade including work practices, technological advances, and new materials and equipment
Related Components	a list of products, items, materials and other elements relevant to the block
Tools and Equipment	categories of tools and equipment used to perform all tasks in the block; these tools and equipment are listed in Appendix A
Context	information to clarify the intent and meaning of tasks
Required Knowledge	the elements of knowledge that an individual must acquire to adequately perform a task

The appendices located at the end of the analysis are described as follows:

Appendix A — Tools and Equipment	a non-exhaustive list of tools and equipment used in this trade
Appendix B — Glossary	definitions or explanations of selected technical terms used in the analysis
Appendix C — Acronyms	a list of acronyms used in the analysis with their full name
Appendix D — Block and Task Weighting	the block and task percentages submitted by each jurisdiction, and the national averages of these percentages; these national averages determine the number of questions for each block and task in the Interprovincial exam
Appendix E — Pie Chart	a graph which depicts the national percentages of exam questions assigned to blocks
Appendix F — Task Profile Chart	a chart which outlines graphically the blocks, tasks and sub-tasks of this analysis

DEVELOPMENT AND VALIDATION OF ANALYSIS

Development of Analysis

A draft analysis is developed by a committee of industry experts in the field led by a team of facilitators from HRSDC. This draft analysis breaks down all the tasks performed in the occupation and describes the knowledge and abilities required for a tradesperson to demonstrate competence in the trade.

Draft Review

The NOA development team then forwards a copy of the analysis and its translation to provincial and territorial authorities for a review of its content and structure. Their recommendations are assessed and incorporated into the analysis.

Validation and Weighting

The analysis is sent to all provinces and territories for validation and weighting. Participating jurisdictions consult with industry to validate and weight the document, examining the blocks, tasks and sub-tasks of the analysis as follows:

BLOCKS	Each jurisdiction assigns a percentage of questions to each block for an examination that would cover the entire trade.
TASKS	Each jurisdiction assigns a percentage of exam questions to each task within a block.
SUB-TASKS	Each jurisdiction indicates, with a YES or a NO, whether or not each sub-task is performed by skilled workers within the occupation in its jurisdiction.

The results of this exercise are submitted to the NOA development team who then analyzes the data and incorporates it into the document. The NOA provides the individual jurisdictional validation results as well as the national averages of all responses. The national averages for block and task weighting guide the Interprovincial Red Seal Examination plan for the trade.

This method for the validation of the NOA also identifies common core sub-tasks across Canada for the occupation. If at least 70% of the responding jurisdictions perform a sub-task, it shall be considered common core. Interprovincial Red Seal Examinations are based on the common core sub-tasks identified through this validation process.

Definitions for Validation and Weighting

YES	sub-task performed by qualified workers in the occupation in a specific jurisdiction
NO	sub-task not performed by qualified workers in the occupation in a specific jurisdiction
NV	analysis Not Validated by a province/territory
ND	trade Not Designated in a province/territory
NOT COMMON CORE (NCC)	sub-task, task or block performed by less than 70% of responding jurisdictions; these will not be tested by the Interprovincial Red Seal Examination for the trade
NATIONAL AVERAGE %	average percentage of questions assigned to each block and task in Interprovincial Red Seal Examination for the trade

Provincial/Territorial Abbreviations

NL	Newfoundland and Labrador
NS	Nova Scotia
PE	Prince Edward Island
NB	New Brunswick
QC	Quebec
ON	Ontario
MB	Manitoba
SK	Saskatchewan
AB	Alberta
BC	British Columbia
NT	Northwest Territories
YT	Yukon Territory
NU	Nunavut

ANALYSIS

SAFETY

Safe working procedures and conditions, accident prevention, and the preservation of health are of primary importance to industry in Canada. These responsibilities are shared and require the joint efforts of government, employers and employees. It is imperative that all parties become aware of circumstances that may lead to injury or harm. Safe learning experiences and work environments can be created by controlling the variables and behaviours that may contribute to accidents or injury.

It is generally recognized that safety-conscious attitudes and work practices contribute to a healthy, safe and accident-free work environment.

It is imperative to apply and be familiar with the Occupational Health and Safety (OH&S) Acts and Workplace Hazardous Materials Information System (WHMIS) Regulations. As well, it is essential to determine workplace hazards and take measures to protect oneself, co-workers, the public and the environment.

Safety education is an integral part of training in all jurisdictions. As safety is an imperative part of all trades, it is assumed and therefore it is not included as a qualifier of any activities. However, the technical safety tasks and sub-tasks specific to the trade are included in this analysis

SCOPE OF THE TOWER CRANE OPERATOR TRADE

"Tower Crane Operator" is this trade's official Red Seal occupational title approved by the CCDA. This analysis covers tasks performed by tower crane operators whose occupational title has been identified by some provinces and territories of Canada under the following names:

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
Crane & Hoisting Equipment Operator: Branch 3 Tower Crane Operator							✓						
Crane Operator					✓								
Tower Crane Operator		✓	✓			✓				✓			
Tower Crane Operator sub-trade								✓					

Tower crane operators operate tower cranes to lift, move, position and place materials and equipment. They perform pre-operational inspections. They calculate the crane's lifting capacities according to the crane's load chart and determine load weight, participate in setting up and dismantling cranes, and position and stabilize the crane before the lift. Tower crane operators work with other workers to make sure the load is placed exactly where they need it. They also perform regular inspections, and do minor repairs and maintenance on the equipment.

Tower crane operators work in the heavy industrial, commercial, residential and civil sectors. They may be employed by construction, surface mining, shipbuilding, offshore drilling rigs, railway and crane rental companies.

Tower cranes are used for specific worksite requirements, as they have a smaller footprint and are productive on sites where they will be used for a lengthy period. Some tower cranes are constructed by bolting a base to a specially made concrete pad and then erecting a tower (mast) of latticed steel up from it. Engineered counterweights are used to provide stability. On a hammerhead crane a boom or jib extends horizontally across the top of the crane. A crane cab where the operator sits is installed where the mast and boom meet. Luffer cranes have a jib that can be raised and lowered. Self-erecting cranes are set on retractable outriggers for support, have a mast and boom, and they are designed to be more mobile and versatile on jobsites.

They work outdoors in all kinds of weather, at heights and in noisy environments. Tower crane operators may be required to work in remote job sites.

The key attributes for tower crane operators are that they should be mechanically inclined, comfortable with working at heights and have good hand-eye coordination, excellent eye sight, and math skills. Safety is the number one priority for tower crane operators. Tower crane operators need to work cautiously and with extreme precision to ensure the safety of others. Physical fitness and good balance are important as the job requires them to climb up great heights and the operation of some cranes and the handling of accessories are physically demanding. Another key attribute is communication skills to effectively communicate with site personnel, supervisors, riggers, signallers and other tradespeople.

The skills of tower crane operators are transferable to operating other types of cranes and heavy equipment. With experience, tower crane operators may move into careers such as business owners, supervisors, trainers and job coordinators. As with other trades, the ability to mentor apprentices is extremely important to pass on the skills, knowledge and expertise of the trade.

OCCUPATIONAL OBSERVATIONS

Safety is the number one concern of tower crane operators, owners and contractors. Tower crane operators are required to take site-specific safety training to be familiar with the company, contractor and jobsite safety requirements. The regulatory environment in which Canada's crane industry operates continues to grow more complex and more rigorous, covering issues such as licensing, due diligence and liability.

As cranes are becoming more sophisticated, the need for training is increasing. There are advances in computer technology, metallurgy and other disciplines associated with the engineering of crane equipment.

Due to technological advances in operator aids such as load moment indicators (LMI), tower crane operators are more aware of their crane's operation and its limitations.

There is a greater variety of cranes such as luffer cranes, travelling tower cranes and self-erecting cranes in the tower crane industry.

ESSENTIAL SKILLS SUMMARY

Essential skills are needed for work, learning and life. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change.

Through extensive research, the Government of Canada and other national and international agencies have identified and validated nine essential skills. These skills are used in nearly every occupation and throughout daily life in different ways.

A series of CCDA-endorsed tools have been developed to support apprentices in their training and to be better prepared for a career in the trades. The tools can be used independently or with the assistance of a tradesperson, trainer, employer, teacher or mentor to:

- understand how essential skills are used in the trades;
- learn about individual essential skills strengths and areas for improvement; and
- improve essential skills and increase success in an apprenticeship program.

The tools are available online or for order at: www.hrsdc.gc.ca/essentialskills.

The application of these skills may be described throughout this document within the competency statements which support each subtask of the trade. The following are summaries of the requirements in each of the essential skills, as described by subject matter experts who participated in the NOA for tower crane operator.

Reading
In their daily work, tower crane operators read and comprehend several types of text. These include safety and work procedures as well as more complex regulations and manufacturers' operating manuals.

Document Use
Tower crane operators use workplace documents such as log books, load charts, hazard assessments and workplace policies and procedures to carry out their job. They must be familiar with regulations relating to hoisting, rigging and safe work environments. They must have the ability to read and interpret manufacturers' specifications and load charts for the model of crane they are using. Depending on site-specific requirements, they may obtain information from engineered and construction drawings and plans such as climbing schematics and schedules.

Writing
Tower crane operators use writing skills to record comments or notes in logbooks or work records. They write messages to colleagues or management to give work details or reply to requests for technical information. They may also write longer descriptions and explanations for various reporting and data collection forms.

Oral Communication
Tower crane operators use oral communication skills to coordinate work with site crews. Clear communication of technical and complex information is very important to avoid injuries and promote efficiency. Tower crane operators also use communication skills instructing apprentices, co-workers and on-site work crews. Good listening and visual skills are also required to communicate with riggers, signallers and other operators during lifts. Tower crane operators use verbal communication and hand signals to communicate the pace of lift movements and precise positioning of loads.

Numeracy
Tower crane operators use a range of math skills in their daily work. These include mathematical and physics concepts such as conversions, geometry, algebraic calculations, measurement and calculating load and lift requirements. They use load charts and manufacturers' specifications to further determine procedures, limits, and the necessary equipment for rigging and hoisting.

Thinking Skills
Tower crane operators must use decision making skills to perform work planning and prioritizing. The decisions they make about the sequence of work have implications for everyone on site. Tower crane operators require strong analytical skills to effectively use their equipment.

Tower crane operators use problem solving skills to choose set-up locations and crane configurations for specific jobs. During lifts tower crane operators make operational decisions to start, stop and vary the speed and direction of lifts to ensure safe movement and placement of a load. They evaluate the safety of lifts before and during lifts and stop work if necessary.

Working with Others
To be effective, tower crane operators must establish close and ongoing job-task coordination with other workers on the job site. They work closely with clients and co-workers to plan lifts and ensure that their activities are coordinated with those of on-site crews. The operator may be located high in the operator's cab and physically removed from their co-workers; however they are in close communication with riggers, signallers and supervisors to coordinate lifts and load placements. Tower crane operators work in close coordination with other operators when performing multiple crane lifts and when in close proximity with other cranes and heavy equipment.

Computer Use
Tower crane operators are increasingly required to interpret electronic data transmitted to them from LMI, anemometers and electronic scales located in the cab of the crane. Controls for the tower crane may also involve computerized applications.

Continuous Learning

As construction methods and crane technology are advancing, tower crane operators must keep abreast of these developments. Regulatory changes may require additional certification such as for service work, erection and climbing, and ongoing learning to ensure compliance and safe working conditions.

Trends Safety regulations are becoming more diligent in creating awareness in accident prevention and enforcing safety procedures. There is more emphasis on open and group communication on work sites. There is an ongoing trend to document group input to safety topics and concerns at daily tool box and weekly safety meetings.

Related Components All components apply.

Tools and Equipment See Appendix A.

Task 1 Performs safety-related functions.

Context Tower crane operators use personal protective equipment (PPE) and other safety equipment to comply with safety regulations. They maintain a safe work environment by assessing job site hazards and engaging in safe work practices.

Required Knowledge

K 1	types of PPE such as safety boots, hard hats, safety glasses, safety vests, hearing protection and fall arrest equipment
K 2	types of safety equipment such as first aid kits, fire extinguishers and spill kits
K 3	inspection, care, use, location and expiry date of PPE according to manufacturers' specifications and site-specific requirements such as type of work boots and hard hats used
K 4	surrounding and occupational hazards such as chemical substances, energized conductors and weather conditions
K 5	environmental hazards such as oil spills and disposal of hazardous materials
K 6	jurisdictional safety legislation and regulations such as WHMIS and OH&S
K 7	Canadian Standards Association (CSA) standards such as Z248
K 8	manufacturers' specifications
K 9	site-specific safety policies and procedures such as evacuation and emergency procedures

K 10	limits of approach to power lines and other obstacles such as guy wires, buildings and other machinery
K 11	considerations for performing lifts over energized conductors such as site specific policies and procedures and jurisdictional requirements
K 12	operating limitations and restrictions due to weather conditions
K 13	proper and secure placement of crane components such as guard rails, ladders and platforms
K 14	swing radius of crane relative to areas where the public and co-workers have access
K 15	approved engineered lifting devices such as bins, bottle cages and spreader beams for specific lifting application and authorized by a professional engineer when required by a jurisdicton

---

Sub-task

A-1.01 **Uses personal protective equipment (PPE) and safety equipment.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

A-1.01.01	select PPE and safety equipment such as fall arrest equipment, fire extinguisher, safety glasses and gloves according to task
A-1.01.02	ensure proper fit of PPE according to manufacturers' specifications
A-1.01.03	recognize and replace worn, damaged and defective PPE and safety equipment
A-1.01.04	apply PPE and safety equipment according to task and manufacturers' specifications
A-1.01.05	clean, maintain and store PPE according to manufacturers' specifications and site requirements

Sub-task

A-1.02 Maintains safe work environment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

A-1.02.01	participate in tool box talk and speak to site superintendent to be made aware of site specific anomalies and irregularities such as changes in the worksite that impact the working radius of the tower crane and damage to crane
A-1.02.02	conduct risk assessment of worksite for hazards such as open excavations, traffic, wires and obstacles
A-1.02.03	recognize, report and monitor potential hazards such as oil spills on deck, guy wires and missing guard rails
A-1.02.04	secure work area and ensure that site personnel are made aware during bottom-climbing and top-climbing procedures
A-1.02.05	minimize hoisting or suspending loads over workplace personnel or the public
A-1.02.06	suggest safe placement areas for loads to relieve congestion and facilitate a hazard-free environment
A-1.02.07	ensure loads are secure and free of loose debris
A-1.02.08	use approved engineered lifting devices such as bins, bottle cages and spreader beams according to specific lifting application
A-1.02.09	apply limit of approach according to regulations such as Power Line Hazards (PLH) according to voltage of powerline
A-1.02.10	apply limit of approach regulations to other obstacles
A-1.02.11	verify crane is grounded according to manufacturers' specifications
A-1.02.12	interpret and apply safety regulations such as WHMIS and OH&S
A-1.02.13	operate within limits and use caution according to manufacturers' specifications, CSA and jurisdictional requirements when operating tower crane in weather conditions such as wind, temperature and approaching electrical storms
A-1.02.14	secure placement of crane components such as guard rails, ladders and platforms
A-1.02.15	maintain cab for climate control
A-1.02.16	maintain cab for safe operation practices such as cleanliness to avoid obstruction of controls or view

Task 2 — Contributes to workplace organization.

Context Tower crane operators need to communicate with supervisors, riggers and other crane operators to coordinate their work to ensure a safe and efficient work environment. They document daily activities and incidents, and reference documentation to ensure proper use of the tower crane.

Required Knowledge

K 1	hand signals for communications such as trolleying, luffing, booming, hoisting, swinging, stopping, emergency stop and dogging the crane
K 2	Canadian Radio-television and Telecommunications Commission (CRTC) regulations regarding crane radio communications
K 3	company policies and procedures such as emergency, operating and blind lift procedures
K 4	roles and responsibilities of signallers
K 5	manufacturers' specifications and operating instructions of electronic communication equipment
K 6	types of communication equipment such as headset, microphone, two-way radio and base station
K 7	manufacturers' specifications for crane
K 8	jurisdictional legislation and regulations such as WHMIS and OH&S
K 9	CSA standards such as Z248
K 10	location of documentation such as operating manual, crane certification and load charts

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Sub-task

A-2.01 Communicates with others.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

A-2.01.01	participate in meetings such as tool box, safety and orientation meetings
A-2.01.02	discuss with supervisor the plan for the day to determine priorities and schedule
A-2.01.03	discuss job task and requirements with riggers such as what the load is and where the load is required to go

A-2.01.04	coordinate with supervisor and rigger to identify and confirm their understanding of the importance of the rigger's responsibilities in a blind lift situation
A-2.01.05	use communication devices such as radio and hand signals to communicate with riggers and other equipment operators capable of interfering with crane operation
A-2.01.06	use dedicated radios to communicate with other crane operators to coordinate activities and avoid collisions
A-2.01.07	mentor apprentices on items such as safe operation of the crane
A-2.01.08	report problems and unsafe conditions to individuals such as safety officer and supervisor

---

Sub-task

A-2.02 Uses documentation.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

A-2.02.01	review and update logbooks for activities such as repairs and maintenance
A-2.02.02	complete written statements for reports such as incident reports, lift studies and daily tasks performed
A-2.02.03	locate and reference sources of information such as manufacturers' specifications, operating manual, safety information, load charts, crane certification, and company policies and procedures
A-2.02.04	interpret text and diagrams in documents such as operating manual for crane operation and maintenance
A-2.02.05	create load lists for hauling components away from job sites

BLOCK B

CRANE INSPECTION AND MAINTENANCE

Trends

Emphasis on safety on worksites has led to greater attention being paid to pre-operational inspection activities. As cranes have become more sophisticated, specialized technicians are frequently called. Tower crane operators should have a good understanding of the crane's functions and systems to know its maintenance requirements.

Related Components (including, but not limited to)

Structural components: mast, apex, gantry, jib, counter jib, pendant lines, base, cab, anchor, tower bolts, jib pins, turntable, bolts, tie-ins, climbing units, counterweights.

Mechanical components: winches, sheaves, swing motors, brakes, gear boxes, mechanical safety devices, trolley components.

Hydraulic system components: pumps, lines, cylinders, fluid reservoir, valves, pressure gauges.

Electrical system components: limit switches, grounding, supply cables, disconnect switches, strain relief devices, power supply.

Support components: guy wires, support arms (tie-in beams), collars, wedges, resting beams, bolts and pins, shoring, outriggers, bearing pads, base, ballast, base cross.

Track travel components: rail trucks, rail wheels, rail stops, ties, clamps, track, spikes, travelling undercarriage wheel brakes, wheel guards, electrical cable components, tie-downs.

Cab components: LMI, control levers, deadman controls, windows, heater, air conditioning, foot pedals for horn and radio, anemometer.

Safety and access components: ladders, hatches, platforms, railings, catwalks, fall restraint and safety alarms.

Tools and Equipment

See Appendix A.

Task 3 — Performs pre-operational checks and regular inspections.

Context These inspections must be performed on a regular prescribed basis to ensure that the crane has been signed off by a professional engineer when required by a jurisdiction and has met safety, manufacturers', and company specifications. All inspection activities must be documented in a log book to comply with regulations and to preserve machine history for future reference.

Required Knowledge

K 1	manufacturers' specifications, local OH&S and CSA standards such as Z248
K 2	manufacturers' and CSA inspection guidelines
K 3	WHMIS requirements
K 4	structural components such as mast, jib, apex, gantry, counter jib, pendant lines, base, cab, anchor, tower bolts, jib pins, turntable, bolts and counterweights
K 5	mechanical components such as winches, sheaves, swing motors, brakes, gear boxes, mechanical safety devices and trolley components
K 6	hydraulic system components such as pumps, lines, cylinders, fluid reservoir, valves and pressure gauges
K 7	electrical system components such as limit switches, grounding, supply cables, disconnect switches, strain relief devices (power cable supports) and power supply
K 8	support components such as guy wires, support arms (tie-in beams), collars, wedges, resting beams, bolts and pins, shoring, outriggers, bearing pads, base, ballast and base cross
K 9	track travel components such as rail trucks, rail wheels, rail stops, ties, clamps, track, spikes, travelling undercarriage wheel brakes, wheel guards, electrical cable components and tie-downs
K 10	cab components such as LMI, control levers, deadman controls, windows, heater, foot pedals and anemometer
K 11	safety and access components such as ladders, hatches, platforms, railings, catwalks, fall restraint and safety alarms
K 12	engine and power transmission systems
K 13	drive systems such as belt-driven, gear-driven and fluid-driven
K 14	outrigger components such as beams, jacks and jack pads
K 15	types of counterweights such as fixed, stackable, removable and ballast
K 16	jurisdictional requirements for non-destructive testing (NDT)
K 17	types of wire rope such as rotation resistant, right regular lay and left regular lay

K 18	wire rope termination and connection fittings
K 19	wire rope rejection criteria such as breakage and wear
K 20	location, chain of custody, historical details of crane modifications and duration of inspection documentation
K 21	inspection documentation for crane being operated
K 22	legal requirements for completing professional engineering and inspection documentation
K 23	manufacturer safety standards and requirements

Sub-task

B-3.01 **Inspects structural components.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

B-3.01.01	identify defects and deficiencies such as cracks, wear points, cracked welds, deformations and stretching
B-3.01.02	verify that structural fasteners such as bolts, pins and retaining devices are in place and tightened to manufacturers' specifications
B-3.01.03	verify base conditions such as ground conditions, spalling concrete and outrigger placement
B-3.01.04	check that cab is secure and in good condition, visually checking for deficiencies such as corrosion and missing fasteners
B-3.01.05	check counterweight mounts and suspension devices for conditions and placement according to manufacturers' specifications
B-3.01.06	verify that attachments such as signage and flags are fastened securely according to engineered specifications

Sub-task

B-3.02 **Inspects mechanical components.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

B-3.02.01	check fluid levels such as oil and coolant to ensure that the level is to manufacturers' specifications
B-3.02.02	check fluids for contamination and colour of oil
B-3.02.03	verify function of breather system for gear boxes to ensure adequate air transfer
B-3.02.04	identify defects and deficiencies such as leaks, worn points, broken mounting hardware, and worn belts and hoses
B-3.02.05	check hoist winch, luffing winch and trolley winch brakes for wear, contamination and adjustment according to manufacturers' specifications
B-3.02.06	verify fasteners and hardware are intact and functional according to manufacturers' specifications
B-3.02.07	check operation of sheaves and wire rope drums for excessive wear, fleet angle and that wire rope is spooling correctly
B-3.02.08	verify rope end connections to the drum and the becket are secure according to connection system and manufacturers' specifications

Sub-task

B-3.03 **Inspects lines and wire ropes.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

B-3.03.01	measure diameter of wire rope using tools such as callipers and verify against CSA and manufacturers' specifications
B-3.03.02	perform visual inspection to identify defects and deficiencies such as improper size, broken wires, abrasion, crushed strands, corrosion, kinks, bird caging, electric arc and metal fatigue
B-3.03.03	verify line path for improper reeving, sheave alignment and obstructions

B-3.03.04	check lubrication of wire rope by examining for corrosion, bare spots and build-up
B-3.03.05	check tension of trolley cable to ensure trolley operation

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Sub-task

B-3.04 **Inspects hydraulic system components.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

B-3.04.01	perform visual inspection for deficiencies such as leaking seals, bent rams, broken mounting hardware and leaking hoses
B-3.04.02	check hydraulic fluid levels to ensure that the level is to manufacturers' specifications
B-3.04.03	verify pump is working within pressure parameters by checking gauges when present and accessible

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Sub-task

B-3.05 **Inspects electrical system components.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

B-3.05.01	perform visual inspection of components for deficiencies such as damaged power supply cables, worn strain relief devices (power cable supports), disconnected cables and corroded parts
B-3.05.02	check grounding of crane according to manufacturers' specifications
B-3.05.03	ensure that electrical components are protected from water, humidity and pests

Sub-task

B-3.06 **Inspects support components.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

B-3.06.01	perform visual inspection of guy wires and anchorage points for deterioration and damage
B-3.06.02	perform visual inspection of related support equipment for top-climbing cranes such as support arms, tie-ins and anchor shoes for deficiencies such as damaged pins, deformities and detachments from concrete
B-3.06.03	perform visual inspection of related support equipment for bottom-climbing cranes such as beams, wedges and shoring
B-3.06.04	perform visual inspection of related support equipment for self-erecting cranes such as outriggers, arms and support mechanisms
B-3.06.05	perform inspection of ground conditions around crane bases such as self-erect crane bases

Sub-task

B-3.07 **Inspects track travel components.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

B-3.07.01	perform visual inspection of track for obstructions, track condition and broken ties
B-3.07.02	perform visual inspection of track components such as stops, ballast, limit switches, structural supports and tie-down clamps to ensure they have been installed according to manufacturers' specifications

Sub-task

B-3.08 **Inspects cab components.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

B-3.08.01	perform visual inspection for deficiencies such as unstable seat, broken controls, and inadequate ventilation, heating and air conditioning
B-3.08.02	verify that load chart is secured and legible
B-3.08.03	check condition of glass for fractures
B-3.08.04	check function of gauges and instrumentation such as anemometer, thermometer and LMI
B-3.08.05	verify function of communication and warning devices such as radio and horn

Sub-task

B-3.09 **Inspects safety and access components.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

B-3.09.01	identify defects and deficiencies such as cracks, wear points, cracked welds, deformations and stretching
B-3.09.02	verify that fasteners such as bolts, pins and retaining devices are in place and tightened to manufacturers' specifications
B-3.09.03	check that access areas are cleaned and clear of obstructions
B-3.09.04	check condition of safety components such as hand railings, catwalks, fall restraint lines, anchorage points and guards over moving parts
B-3.09.05	identify hazards on access components such as slippery ladders and frost

Sub-task

B-3.10 Completes inspection documentation.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

B-3.10.01	record all relevant activities in log book by writing clearly and accurately
B-3.10.02	report documented inspection and repair issues to authorities such as superintendent
B-3.10.03	organize documentation to ensure that it is complete, accurate and easily referenced
B-3.10.04	log inspection activities at regular intervals such as daily, weekly, monthly and yearly

Task 4 Performs continual checks.

Context Tower crane operators must be constantly aware and monitoring the machine performance and condition. Site conditions are constantly changing and impact the crane's operation.

Required Knowledge

K 1	weather conditions such as wind, lightning and temperature
K 2	ground conditions such as soil compaction, grade and possible ground disturbances
K 3	location of underground utilities
K 4	risks of electric, electromagnetic field and microwave charges and use of non-conductive rigging
K 5	manufacturers' specifications, OH&S and CSA standards such as Z248
K 6	crane components such as hoist lines, boom-hoist lines and luffer jibs
K 7	expected performance of crane and its components
K 8	LMI and load scale
K 9	limit switches and their operation
K 10	crane controls and crane operation

K 11	WHMIS requirements
K 12	overlap of multiple cranes on site, and communication and right of way protocols

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Sub-task

B-4.01 Monitors site conditions.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

B-4.01.01	recognize weather hazards such as wind, lightning, temperature and fog using gauges such as anemometer and thermometer
B-4.01.02	monitor activities of ground personnel in relation to activities of the crane
B-4.01.03	maintain awareness of changes to site such as new equipment, height of obstructions, overhead obstructions, overlaps of other cranes and excavation of site
B-4.01.04	evaluate ground conditions such as bearing surface compaction, standing water and location of underground utilities
B-4.01.05	determine changes to operator's access and egress to crane because of ongoing changes to site

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Sub-task

B-4.02 Monitors lines and wire ropes.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

B-4.02.01	recognize indications (vibration, noise) of problematic conditions such as damage to wire rope, deviation from line path and improper spooling
B-4.02.02	perform visual inspection for deficiencies such as protruding cores and bird caging
B-4.02.03	monitor tension of trolley cable

Sub-task

B-4.03 **Monitors equipment performance and conditions.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

B-4.03.01 interpret gauges and warning systems such as fuel indicator, boom angle indicator, engine operating temperature gauge and LMI

B-4.03.02 perform sensory inspection to detect malfunctions and changes such as overheating engine and electrical motors, debris build-up in sheaves and abnormal noises

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Sub-task

B-4.04 **Monitors structural and support components.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

B-4.04.01 check pins, bolts and hardware on structural components such as jib, pendants and mast to ensure that they are intact and secure

B-4.04.02 check tie-backs, collars and support arms by evaluating visually and by feeling for instability during crane movement

B-4.04.03 verify level of self-erecting crane using levels and check outriggers, pads and mats

B-4.04.04 check movement of counterweights

Task 5 — Performs minor crane maintenance.

Context Tower crane operators perform minor maintenance activities to optimize the performance and safety of the crane. Larger maintenance activities are carried out by specifically trained technicians who may be assisted by the operator.

Required Knowledge

K 1	location of filters, drain plugs, filler caps and shut-off
K 2	types of oils, lubricants and greases
K 3	disposal requirements
K 4	hazards and precautions working with oils, lubricants and greases (WHMIS)
K 5	filter types and breather
K 6	normal crane operation
K 7	company and manufacturers' policies and procedures such as fluid replacement schedules, and service and maintenance intervals
K 8	battery boosting procedures
K 9	impact of weather and seasonal conditions on equipment functions and fluids
K 10	application methods for oils, lubricants and grease
K 11	lock-out and tag-out procedures

Sub-task

B-5.01 Maintains mechanical components.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	no	yes	yes	yes	yes	no	NV	NV	ND

Key Competencies

B-5.01.01	verify brakes are adjusted according to manufacturers' specifications
B-5.01.02	top up fluid levels and verify using dipstick and sight glass
B-5.01.03	tighten and replace fasteners

Sub-task

B-5.02 **Lubricates wire ropes and crane components.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

B-5.02.01	use product specified by manufacturers for wire ropes and components being lubricated on all operator-serviceable lubrication points
B-5.02.02	apply lubricant according to specifications and required service intervals and environmental conditions using equipment such as grease guns, caulking guns and aerosol sprays

BLOCK C — CRANE SET-UP, HOISTING CALCULATIONS AND LIFT PLANNING

Trends

Standards for the competency level of assembly/disassembly crews are strengthening. Changing technology in crane construction such as control systems and structural design is changing how operators climb, erect and dismantle tower cranes. In some jurisdictions, tower crane operators have a greater role and responsibility in each of the above operations. Furthermore, the importance of planning lifts and reviewing the relevant safety documentation is also increasing.

Related Components

All components apply.

Tools and Equipment

See Appendix A.

Task 6 — Participates in tower crane assembly, disassembly and transportation.

Context

This task encompasses the assembly and disassembly of a tower crane. Tower crane operators have the competence to assist and coordinate with many other crew members to accomplish this task.

Required Knowledge

K 1	major crane components such as mast, jib, counter jib, counterweights, hoist drums, ring gear, outrigger, hydraulic cylinders, ballast and trolley
K 2	operating systems such as hydraulic, electrical and lubrication
K 3	jurisdictional inspection and certification requirements, and documentation requirements such as professional engineered drawings and inspection documents
K 4	components' purpose such as that jib serves to extend radius and support load
K 5	OH&S regulations, and company policies and procedures
K 6	rigging practices and components
K 7	working in conjunction with mobile crane

K 8	manufacturers' specifications for model of tower crane being erected, dismantled or relocated
K 9	types of deficiencies in the equipment such as dents, cracks and leaking gear box
K 10	applicable legislation such as appropriate class of driver's licence, traffic laws, permits and use of flashing lights
K 11	route and destination
K 12	road conditions
K 13	ground conditions for set-up
K 14	site conditions and job specifications (lift requirements)

Sub-task

C-6.01 Participates in crane assembly.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	no	NV	NV	ND

Key Competencies

C-6.01.01	coordinate roles and responsibilities with crew members for assembly according to site, job and manufacturers' specifications
C-6.01.02	inspect base for matching to erection manual
C-6.01.03	inspect structural components such as tower sections, turntable, apex, counter jib, jib, pendants, bolts and pins, and trolley for deficiencies such as cracks, welds, bends and dents
C-6.01.04	erect structural components such as tower sections, turntable, apex, counter jib, jib, pendants, counterweights, ballast, bolts and pins, and trolley
C-6.01.05	inspect sheaves and cables, and reeve cables
C-6.01.06	check fluids, operating systems and other components as required by job specifications and manufacturers' specifications
C-6.01.07	set limits according to manufacturers' specifications
C-6.01.08	coordinate transport trucks and inspect loads for deficiencies

Sub-task

C-6.02 Participates in crane disassembly.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	no	NV	NV	ND

Key Competencies

C-6.02.01	coordinate roles and responsibilities with crew members for disassembly according to site, job and manufacturers' specifications
C-6.02.02	disable operating systems according to manufacturers' specifications
C-6.02.03	unreeve cables
C-6.02.04	dismantle structural components in sequence according to manufacturers' specifications
C-6.02.05	coordinate transport trucks to haul components away from job-site

Sub-task

C-6.03 Transports self-erecting tower crane. (NOT COMMON CORE)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	no	no	yes	yes	no	NV	NV	ND

Key Competencies

C-6.03.01	confirm route and location with crane owner or dispatcher
C-6.03.02	secure crane by ensuring the locking pins and outriggers are in place
C-6.03.03	move carrier mounted self-erecting crane on site and public roads according to jurisdictional regulations
C-6.03.04	confirm job requirements and site conditions with site personnel

Sub-task

C-6.04 **Participates in assembly and disassembly of self-erecting tower cranes. (NOT COMMON CORE)**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	no	no	yes	yes	no	NV	NV	ND

Key Competencies

C-6.04.01	verify ground conditions for set-up
C-6.04.02	assess surroundings for obstructions and hazards
C-6.04.03	set outriggers according to manufacturers' specifications
C-6.04.04	ensure power supply and ground the crane
C-6.04.05	erect crane according to manufacturers' specifications
C-6.04.06	ensure crane is level using methods such as checking built-in level, and putting hand level on base and tower, and adjust as required
C-6.04.07	dismantle crane according to manufacturers' specifications
C-6.04.08	secure crane for transport by ensuring the locking pins and outriggers are in place

Task 7 Plans lifts.

Context Planning is required for every lift that a tower crane operator performs whether routine or specialty. This could mean a brief conversation with the rigger or a larger meeting with the entire crew and management.

Required Knowledge

K 1	factors affecting the lift such as tail swing, load path and clearances
K 2	roles and responsibilities of all persons involved with the lift
K 3	factors that affect equipment stability such as ground and supporting conditions
K 4	actual and potential hazards such as overhead utilities and guy wires, vehicular traffic and personnel
K 5	rigging equipment and techniques
K 6	material scheduling requirements to coordinate with ground personnel
K 7	load charts and engineered drawings
K 8	industry terminology

K 9	radius, boom length, angle and gross capacity
K 10	LMI system
K 11	sources of load weight information such as bills of lading, stamped weights, engineered drawings and previous lift history
K 12	formulas for conversion between imperial and metric systems
K 13	basic geometry
K 14	factors contributing to load weight such as ice, snow, crating and shifting liquids
K 15	effects of weather
K 16	manufacturers' specifications and operating manual for model of crane being used
K 17	jurisdictional regulations
K 18	methods of measuring radius such as taking measurements and doing a dry run
K 19	line pull and working load limit (WLL)
K 20	boom deflection
K 21	centre of gravity and attachment points
K 22	specialty lifts such as engineered, multi-crane, personnel, center of gravity change, over high energized lines, and lifts where the length of a sling changes
K 23	specialty lift form regulations according to CSA requirements

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Sub-task

C-7.01 Interprets load charts.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

C-7.01.01	set configuration of LMI according to job requirements
C-7.01.02	select load chart based on crane configuration and lift requirements such as maximum radius and height
C-7.01.03	define working radius based on weight of load
C-7.01.04	calculate gross load and net capacity

Sub-task

C-7.02 Plans work procedures.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

C-7.02.01	coordinate roles and responsibilities with crew members according to site, job and manufacturers' specifications
C-7.02.02	sequence activities according to job requirements and weather conditions
C-7.02.03	ensure tasks are within working radius
C-7.02.04	ensure rigging equipment required is available according to job requirements
C-7.02.05	select crane configuration and attachments according to lift requirements

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Sub-task

C-7.03 Prepares for specialty lifts.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	no	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

C-7.03.01	determine weight, size, centre of gravity and shape of load
C-7.03.02	determine maximum radius allowed according to load weight and load chart
C-7.03.03	determine other components and equipment needed for lift according to lift requirements
C-7.03.04	coordinate roles and responsibilities with crew members according to site, job and manufacturers' specifications
C-7.03.05	sequence activities according to lift requirements
C-7.03.06	ensure specialty lift forms are completed according to CSA, jurisdictional and company requirements

Trends	There is increased liability and accountability on individuals involved in rigging operations. This has increased the need for competent riggers, and maintenance and care of rigging equipment.
Related Components (including, but not limited to)	Blocks, chains, chokers, come-alongs (wire rope or chain), equalizer beams, eye bolts, hooks, ladder jacks, ladders, lines, pulleys, rope guides, saddle cable clips, shackles, sheaves, slings, spreader bars, swivels, tag lines, turnbuckles, wedge sockets.
Tools and Equipment	See Appendix A.

Task 8 — Inspects and maintains rigging equipment.

Context Rigging equipment needs to be properly inspected, maintained and stored to ensure its integrity.

Required Knowledge

K 1	types of cable such as rotating, non rotating, pendant line, hoist line, conventional and lang lay, and their application
K 2	lubricated and non lubricated cables
K 3	types of lubricants, and application requirements and procedures
K 4	types of slings such as wire rope, chain and synthetic (web and rope)
K 5	sling configurations such as continuous loop and double eye and their application
K 6	mechanical devices used to change relation of hook block to centre of gravity such as chain falls, come-alongs and electric winches
K 7	rigging techniques such as centering the load, choke, basket and vertical
K 8	potential damage in wire rope slings and hardware such as deformities, kinks, broken wires, damaged threads and misshapen components
K 9	potential damage to synthetic slings and hardware such as frays, cuts and stretching
K 10	rejection criteria and disposal procedures of slings and hardware
K 11	company policies, and jurisdictional requirements and regulations

K 12	manufacturers' documentation regarding all rigging equipment such as slings, chokers and other related hardware
K 13	storage procedures to protect rigging equipment

Sub-task

D-8.01 **Identifies deficiencies in slings and hardware.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	no	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

D-8.01.01	visually inspect slings for damage such as broken wires, cuts, nicks, stretching, worn links, crushing, missing tags and kinking
D-8.01.02	visually inspect hardware such as shackles and hooks for damage such as stretching, missing or damaged safety latches, and pins not seating properly
D-8.01.03	remove damaged item from service and report item
D-8.01.04	dispose of damaged slings and hardware according to manufacturers' or jurisdictional rejection criteria and company policy

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Sub-task

D-8.02 **Lubricates slings and hardware.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	no	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

D-8.02.01	verify lubricant selected considering factors such as application, environmental requirements and manufacturers' specifications
D-8.02.02	apply lubricant according to application and manufacturers' specifications

Sub-task

D-8.03 Stores rigging equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	no	yes	yes	yes	yes	no	NV	NV	ND

Key Competencies

D-8.03.01	verify storage area will prevent damage to rigging equipment from weather and other site factors such as concrete dust, UV damage, chemicals and extreme heat
D-8.03.02	organize rigging in designated storage area considering factors such as equipment pairing

Task 9 Manages rigging.

Context The tower crane operator should verify that the rigging of the load is satisfactory.

Required Knowledge

K 1	capacities of rigging such as safe working load (SWL)
K 2	types of rigging hardware and replacement hardware such as spring clips, roll pins, shackles, softeners, clevises and hooks, and spreader beams, and their applications
K 3	characteristics of load such as weight, centre of gravity, lifting points and dimensions
K 4	site-specific policies regarding rigging
K 5	OH&S and jurisdictional regulations
K 6	manufacturers' specifications
K 7	configuration of rigging such as basket hitch, multi-legged bridle, vertical and choke
K 8	procedures for selecting and using softening devices

Sub-task

D-9.01 Selects required rigging equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

D-9.01.01	determine rigging requirements to handle load taking into consideration factors such as load weight, load dimensions, sharp edges, rigging equipment composition, swing area, height limitations and destination
D-9.01.02	check tags on rigging equipment to confirm equipment is adequate for the application

Sub-task

D-9.02 Rigs load.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

D-9.02.01	locate centre of gravity of load
D-9.02.02	apply rigging to load using techniques such as basket, choke, vertical and multi-leg bridle according to load requirements
D-9.02.03	test rigging by taking on weight of the load to ensure rigging is rendering properly
D-9.02.04	lower load and make any necessary adjustments to the rigging
D-9.02.05	confirm the absence of loose debris and hazardous materials such as nails, dunnage and rocks on and around the load
D-9.02.06	select tag lines when required and confirm tag lines are positioned to facilitate control of the load
D-9.02.07	assess and communicate the importance of the rigger's role in a blind lift

Sub-task

D-9.03 Monitors rigging.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

D-9.03.01	identify rigging hazards such as obstacles during lifting and landing the load
D-9.03.02	watch tag lines and advise rigger to prevent problems such as tangled and knotted tag lines, and injury
D-9.03.03	watch and feel for rigging problems such as slippage and catching on other objects
D-9.03.04	adjust rigging to address deficiencies

Trends Cranes are becoming more complex and have more automated and computerized controls. There is a greater variety of cranes in the Canadian workplace, including luffer cranes and self-erecting cranes. This requires that tower crane operators acquire a greater knowledge and skill base and continue learning throughout their career.

Related Components All components apply.

Tools and Equipment See Appendix A.

Task 10 Performs pre-lift (warm-up) activities.

Context Daily function tests are essential to ensure that work can proceed.
Pre-lift activities using test blocks confirm that the safety limits are working.

Required Knowledge

K 1	LMI system
K 2	logbook, regulations and manufacturers' specifications
K 3	crane functions
K 4	rigging equipment and techniques
K 5	warm-up techniques taking into consideration weather
K 6	crane limitations
K 7	troubleshooting techniques and who to contact for repair

Sub-task

E-10.01 Performs function test.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

E-10.01.01	input LMI settings such as parts of line to be used
E-10.01.02	swing crane for functioning in all speeds and in both directions
E-10.01.03	check all trolley limits by performing operational checks such as trolleying in and out on jib
E-10.01.04	check final up, high speed up and down limit switches by hoisting up and down
E-10.01.05	boom up and boom down luffer jib for jib angle limits
E-10.01.06	test travel limits for track mounted tower crane

Sub-task

E-10.02 Confirms limits.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

E-10.02.01	perform test such as trolley/luff out a known weight and according to manufacturers' specifications to verify load moment
E-10.02.02	pick up test block to test functions such as hoist, hoist brakes and maximum load limit at jib tip
E-10.02.03	pick up maximum weight test block to test gear capacity, hoist and brake limits

Task 11 — Operates tower cranes.

Context

While there are different types of tower cranes, such as hammerhead, luffer cranes and self-erecting cranes, their operations have many similarities.

Hammerhead cranes move loads by trolleying, swinging, hoisting and travelling.

Luffer cranes differ in that they have a luffer jib to change the lift radius.

The unique characteristic of the self-erecting tower crane is that the erection and dismantling processes are much quicker than for other tower cranes. Once erected the working operations are the same as other tower cranes.

Required Knowledge

K 1	conversion of load weights
K 2	types of tower cranes such as flat tops, top slewing, bottom slewing and rail mounted
K 3	luffer jib raising and lowering methods
K 4	types of self-erecting tower cranes and their components such as transport pins and bogies
K 5	building construction procedures such as steel erection, concrete form work, concrete placement and pre-cast concrete
K 6	operating procedures in various weather conditions such as wind and temperature
K 7	operating characteristics of different models
K 8	components of tower cranes such as jib, counter jib, pendants and apex
K 9	jurisdictional regulations
K 10	precautions for working close to power lines
K 11	general physics principles such as gravity, leverage, momentum and centre of gravity
K 12	site conditions and job specifications (lift requirements)
K 13	function and limit tests
K 14	load charts and interpretation including consideration of gear range
K 15	rigging equipment and techniques
K 16	CSA and OH&S

Sub-task

E-11.01 Trolleys carriage.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

E-11.01.01	move a suspended load in a controlled fashion to a designated location
E-11.01.02	decrease the radius in order to increase the capacity
E-11.01.03	increase the radius in order to increase the operating area (working range)
E-11.01.04	adjust the radius to avoid personnel or obstacles
E-11.01.05	maintain hook block over centre of gravity of load and load block directly below trolley

Sub-task

E-11.02 Booms (luffs) up and down.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	no	yes	yes	yes	NV	NV	ND

Key Competencies

E-11.02.01	confirm jib angle indicator is functioning according to manufacturers' specifications
E-11.02.02	move a suspended load in a controlled fashion to a designated location
E-11.02.03	decrease the radius in order to increase the capacity
E-11.02.04	increase the radius in order to increase the operating area (working range)
E-11.02.05	adjust the radius to avoid personnel or obstacles
E-11.02.06	manipulate jib within designed standards such as load weight and jib angle
E-11.02.07	maintain hook block over centre of gravity of load and load block directly below trolley

Sub-task

E-11.03 **Swings (slews) jib.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

E-11.03.01	move a suspended load in a controlled fashion to a designated location
E-11.03.02	adjust the operating area to avoid personnel or obstacles
E-11.03.03	centre and maintain hook block over centre of gravity of load and load block directly below trolley to avoid side loading
E-11.03.04	slow and stop swing according to manufacturers' specifications

Sub-task

E-11.04 **Hoists load.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

E-11.04.01	position hook block over centre of gravity of load
E-11.04.02	attach rigging to hook or hook block
E-11.04.03	lift, move and place load in controlled manner without shock loading

Sub-task

E-11.05 **Travels crane.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

E-11.05.01	consult operating manual for travel instructions
E-11.05.02	release track dogs according to manufacturers' procedures
E-11.05.03	confirm travel path is clear according to site requirements

E-11.05.04	determine travel distance according to job requirements
E-11.05.05	proceed with travel plan and allow for stopping distance

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Sub-task

E-11.06 Performs functions simultaneously.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

E-11.06.01	engage swing, trolley/luff and hoist functions at various speeds in any given direction simultaneously
E-11.06.02	maintain control of load during all functions
E-11.06.03	control the load on a luffer tower crane while changing radius using the hoist and luffer controls in combination
E-11.06.04	stop crane while maintaining control of the load

Task 12 Climbs (raises) tower cranes.

Context

Climbing cranes involves raising the working height of the upper works. Bottom climbing is done by raising the entire crane and mast and supporting it on beams resting on the surrounding building structure. Top-climbing involves hoisting new sections and adding them to the crane just below the upper works to extend the length of the mast.

It is extremely important to follow engineering and manufacturers' directions and sequence for both bottom and top-climbing procedures.

Required Knowledge

K 1	shoring
K 2	manufacturers' procedures and instructions for climbing crane, and professional engineer's inspection documentation when required by a jurisdiction
K 3	regulations such as CSA Z248
K 4	crane climbing components such as collars, beams, wedges, ladders, and hydraulic rams and pumps
K 5	assembly and climbing sequence

K 6	crane balancing procedures
K 7	site and weather conditions and limitations such as wind speed
K 8	pre-climbing preparations

Sub-task

E-12.01 Performs bottom-climbing procedures.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

E-12.01.01	ensure that shoring is in place and adequate to support the weight of the crane according to engineering specifications
E-12.01.02	prepare for climbing by performing activities such as preparing support beams, removing anchor bolts, and ensuring adequate power cable and grounding is in place according to specifications
E-12.01.03	participate in assembly of climbing unit and equipment according to manufacturers' specifications
E-12.01.04	ensure that travel path is unobstructed by materials such as formwork and reinforcing steel in slab
E-12.01.05	monitor climbing process to ensure that climbing equipment components are performing as designed, such as secured dogs and intact hydraulic hoses
E-12.01.06	check weather conditions before starting and continually monitor changing weather conditions
E-12.01.07	maintain balance during climb by adjusting configuration of crane and changing radius by trolleying or luffing and slewing according to manufacturers' specifications
E-12.01.08	rest crane on support beams according to manufacturers' specifications
E-12.01.09	secure crane structure so that it is plumb by adjusting and securing top and bottom wedges, and assess using level

Sub-task

E-12.02 Performs top-climbing procedures.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

E-12.02.01	ensure that shoring and tie-backs are in place and adequate to support the weight of the crane according to engineering specifications
E-12.02.02	ensure adequate power cable and grounding is in place according to specifications
E-12.02.03	align mast sections in front of the crane as jib must remain immobile during climb
E-12.02.04	install climbing unit to mast according to manufacturers' specifications
E-12.02.05	check weather conditions before starting and continually monitor changing weather conditions
E-12.02.06	balance crane by hoisting mast sections or approved balance weight and changing load radius
E-12.02.07	transfer weight of crane upper works to climbing frame according to manufacturers' specifications
E-12.02.08	climb upper works to create adequate clearance for new mast section to be installed
E-12.02.09	pin or bolt in place new mast section and upper works according to manufacturers' specifications using torque wrench
E-12.02.10	install additional support components such as tie-backs as required by engineering specifications
E-12.02.11	complete climbing procedures by disconnecting climbing unit and removing or stowing according to manufacturers' specifications

Task 13 — Performs specialty tower crane operations.

Context Tower crane operators participate in delicate tower crane operations such as multi-crane lifts, operating a tower crane in a multi-crane site and hoisting personnel. Tower crane operators must be well versed in emergency procedures.

Required Knowledge

K 1	documentation required for specialty lifts
K 2	procedures for communication between crane operators and crew involved in the lift
K 3	CSA standards for multi-crane sites
K 4	emergency and rescue protocols according to site requirements
K 5	engineering documents and specifications such as pick and place order
K 6	exact weight and maximum radius of load
K 7	hand signals and radio use
K 8	types of specialty operations such as multi-crane lifts and personnel lifts
K 9	company, site and jurisdictional regulations
K 10	worksite guidelines such as overlap policy, right of way and priorities
K 11	procedures for attaching specialty equipment such as man baskets and rescue equipment

Sub-task

E-13.01 Participates in multi-crane lifts.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

E-13.01.01	review engineered lift plan for factors such as weight of the load, capacity of the cranes, identification of cranes involved, sequence of activities, emergency contingency plan and means of communication with the crew involved in the lift
E-13.01.02	secure lift zone to ensure manoeuvrability of cranes to avoid dangerous situations
E-13.01.03	respond to instructions and maintain communication with designated signaller in charge of coordinating the lift

E-13.01.04	implement the lift plan for tandem lifts according to company policies and jurisdictional regulations
E-13.01.05	ensure integrity of crane by sustaining constant load control and maintaining a vertical lift point
E-13.01.06	signal a problem or emergency using methods such as an air horn outlined in the lift plan

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Sub-task

E-13.02 Operates in multi-crane site.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

E-13.02.01	check documentation to confirm setup complies with CSA standards, jurisdictional regulations and company guidelines for multi-crane sites
E-13.02.02	identify and confirm which cranes on site have overlapping or conflicting radii
E-13.02.03	contact other crane operators within radius before conducting crane operations such as swinging, luffing and trolleying
E-13.02.04	maintain constant communication with other crane operators on a dedicated line

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Sub-task

E-13.03 Hoists personnel.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	no	yes	NV	NV	ND

Key Competencies

E-13.03.01	review lift plan for factors such as number of people, weight of the load and means of communication with the crew involved in the lift
E-13.03.02	inspect basket for defects, confirm it has been certified by a professional engineer when required by a jurisdiction and ensure inspection report is current
E-13.03.03	confirm capacity of rigging used exceeds the weight of the man basket, personnel and all other loads being transported by a factor of ten

E-13.03.04	confirm personnel to be hoisted have appropriate PPE such as fall arrest
E-13.03.05	conduct test run to confirm the ability of the basket to handle the load and orientation
E-13.03.06	conduct personnel hoisting in accordance with company, site and jurisdictional regulations
E-13.03.07	monitor and maintain communication with personnel in the basket
E-13.03.08	review emergency and rescue protocols, and location of related equipment
E-13.03.09	implement emergency evacuation and rescue procedures

Task 14 — Shuts down and secures tower cranes.

Context Short term shutdowns are those when the tower crane operator must leave the controls of the crane temporarily during the work day. Longer term shutdowns include breaks, overnights and weekends. Extended shutdowns include vacations and job shutdowns in excess of one week.

Required Knowledge

K 1	procedures for securing crane
K 2	manufacturers' recommendations and specifications for securing crane
K 3	government regulations for securing crane
K 4	company policies for securing crane
K 5	surrounding conditions such as other cranes and weather conditions
K 6	length of time crane will be unattended such as during a day's work, overnight and months of job shutdown

Sub-task

E-14.01 Secures crane while leaving controls.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

E-14.01.01	shut off crane
E-14.01.02	ensure load is not left suspended from or supported by crane
E-14.01.03	ensure crane is positioned out of the way of other equipment

E-14.01.04	lock swing brake to ensure that crane does not swing into nearby obstructions such as other cranes and concrete pumps
E-14.01.05	position hook block to ensure block and rigging will not contact obstructions and personnel
E-14.01.06	communicate with ground personnel the intent to leave controls
E-14.01.07	lock out remote control device for self-erecting cranes to prevent unauthorized use

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Sub-task

E-14.02 Secures crane while unattended.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

E-14.02.01	turn off master power
E-14.02.02	ensure load is removed from hook block
E-14.02.03	raise hook block to ensure block and rigging will not contact obstructions and personnel
E-14.02.04	trolley in to minimum radius on hammerhead crane to minimize hook block movement
E-14.02.05	move luffer jib according to manufacturers' specifications and site requirements
E-14.02.06	allow jib to weathervane according to manufacturers' and engineering specifications
E-14.02.07	tie down crane jib according to engineering specifications and job site requirements
E-14.02.08	communicate with ground personnel the intent to leave controls
E-14.02.09	lock out remote control device for self-erecting cranes to prevent unauthorized use
E-14.02.10	apply rail clamps on track mounted crane

Sub-task

E-14.03 Secures crane for extended periods.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	ND	yes	yes	yes	yes	yes	yes	NV	NV	ND

Key Competencies

E-14.03.01	communicate with ground personnel the intent to leave controls
E-14.03.02	ensure load is removed from hook block
E-14.03.03	raise hook block to ensure block and rigging will not contact obstructions and personnel
E-14.03.04	trolley in to minimum radius on hammerhead crane to minimize hook block movement
E-14.03.05	move luffer jib according to manufacturers' specifications and site requirements
E-14.03.06	allow jib to weathervane according to manufacturers' and engineering specifications
E-14.03.07	tie down crane jib according to engineering specifications and job site requirements
E-14.03.08	lock out remote control device for self-erecting cranes to prevent unauthorized use
E-14.03.09	shut off master power supply
E-14.03.10	apply vandal guards
E-14.03.11	apply rail clamps on track mounted crane
E-14.03.12	remove and store the load block, lubricate and spool the load line on the drum, and apply protective cover
E-14.03.13	remove trolley travel ropes, lubricate and spool the trolley rope on the drum, apply protective cover, and restrain trolley to prevent movement
E-14.03.14	protect electrical panels and brake drums with protective covering to prevent birds and animal nesting
E-14.03.15	ensure clearance lights and aviation beacons are functioning as required by regulations

APPENDICES

APPENDIX A TOOLS AND EQUIPMENT

Hand Tools

adjustable wrenches (various sizes)
anemometer
cable puller
calculator
drift pin
flashlight
grease gun
hammers (ball peen, claw, sledge, various sizes)
hammer wrench
infrared thermometer
level
line-up bar
measuring tape
multimeter
oilcan
pliers (needle nose, slip joint)
pry bars
punches (knock-out type, various sizes)
ratchet set
scales
scrapers (various sizes)
screwdrivers (flat, Phillips, Robertson, various sizes)
shovel
snips (heavy duty wire cutting)
sockets and extensions
sprayer
spud wrenches
squeegee
tire pressure gauge
T-bar
tool box
torque wrench and multipliers
vernier caliper
vice grips
wear gauge (wire rope and sheave)
wire brush
wire rope cutter
wire rope winder
wrench sets (open and closed ends, both metric and imperial)

Power Tools

air compressor
angle grinder with attachments
electric drills
forklift
hand-held and stationary radios
headphones
hydraulic jack
hydraulic torque wrench and pump
impact wrenches (electric and pneumatic)
oxy-acetylene brazing torch
oxy-acetylene cutting torch
propane torch
steam cleaner or power washer

Personal Protective Equipment (PPE) and Safety Equipment

coveralls
ear-plugs and muffs
eye wash station
emergency rescue/repel devices
face shields, safety glasses and goggles
fall arrest harness and lanyards
fire blankets
fire extinguishers
fire-retardant coveralls
first aid kit
gloves
hard hat
masks (particles, vapour)
reflectors

Personal Protective Equipment (PPE) and Safety Equipment (continued)

respirators
road flares
safety boots
self-contained breathing apparatus (SCBA)
spill kit
survival suits and personal floatation devices

Hoisting and Rigging Equipment

aerial platforms (boom and scissor lifts)
becket point and wedge socket
blocks
cable clips
chains
chokers (wire rope, chain and synthetic)
come-alongs (wire rope or chain)
chain falls (manual or electric)
equalizer beams
eye bolts
hooks
ladder jacks
ladders
lines
pulleys, sheaves and snatch blocks
rope guides
shackles
slings
softeners
spreader bars
swivels
tag lines
turnbuckles

APPENDIX B GLOSSARY

anemometer	instrument for measuring and indicating the force or speed of the wind
apex	point of the tower crane at the top where the pendants meet so that gravitational forces act on the tower, not on the jib or counter jib
attachments	accessories supplied by manufacturers to aid in crane operations
ballast	stabilizing component usually placed at the base of a tower crane; does not rotate when the crane swings
becket	small eye for fastening hoist line
bird caging	form of deficiency in wire rope
catwalk	accessible walk way on the jib and counter jib
controls	these include all levers, brakes, dogs, switches, buttons and other devices that the crane operator physically manipulates
counterweight	heavy metal or concrete attachments secured to the counter jib to offset the weight of the extended jib and load and increase lift capacity; it rotates when the crane swings
drum	cylindrical component that is used to store and dispense line; the line is wound or spooled onto the drum when the operator causes the drum to rotate
gantry	component of a crane that supports the jibs so that gravitational forces act on the tower, not on the jibs
gross capacity	maximum amount of weight that a specific crane and boom configuration can lift
gross load	weight of the load plus other items, such as the hook block, hoist lines and rigging
hardware	usually refers to rigging hardware, which can be any of a wide range of bolts, hooks, chains, shackles, clamps and other mechanical devices used to secure or attach to loads in preparation for hoisting
hoist line	this may be a single line attached to a ball, lift hook or other assembly; the term hoist line may also be used to describe the compound assembly of lines running through the hook block

hoisting	act of manipulating the crane controls in order to raise or lower a load
hook block	heavy metal block containing sheaves or pulleys; the hook block is equipped with a hook for attachment of loads
hydraulic system	any system that relies on pressurized hydraulic oil to make it function
jib	part of the crane that extends out from the tower and supports the line or lines to which the load is attached
logbook	typically, a book in which the operator is required to record information, such as inspection, maintenance, locations, hours worked as well as damage and repair details
multi-crane lifts	in some instances, it is impossible to accomplish certain lifts using only one crane; in these circumstances, two or more cranes may be attached to the same load and they are used simultaneously to perform the task
outriggers	supports that extend from the carrier vehicle to the ground to provide stability; outriggers are composed of beams and jacks
pads	wood, metal, or synthetic assemblies that are placed under the adjustable ends of the outriggers or tracks; these items increase the amount of bearing and support given by the outriggers or the tracks to the crane
pendant	cable or steel bar which attaches the jib or counter jib to the apex or gantry
radius	horizontal distance from the centre of rotation of a crane to the centre of gravity of a load
reeving	wire rope system in which wire rope travels around drums and sheaves
rigger	designated individual whose duty it is to ensure that loads are appropriately attached or rigged
rigging	components and actions used to secure and attach loads to be lifted
self-erecting crane	tower crane in which tower and jib elements are not disassembled into component sections and which can be transported between sites as a complete unit; the erection and dismantling processes are an inherent part of the crane's function
sheaves	pulleys located in a hook block, boom heads, or other parts of the crane jib on which the line runs
signaller	designated individual who relays information to the crane operator

sling	any metal or synthetic flexible device used to cradle or support a load
spooling	process of winding line either onto or off of a drum on which it is stored
swing (slew)	rotating the upper works horizontally through part or all of the radius or circle
track	rail system on which a travelling carriage operates
weathervaning	act of releasing brakes to allow the crane to free swing
wire rope	often referred to as cable, this material is made of many extremely strong and flexible metal alloy wires wound in various configurations to suit a range of conditions

APPENDIX C

ACRONYMS

CRTC	Canadian Radio-television and Telecommunications Commission
CSA	Canadian Standards Association
LMI	load moment indicator
NDT	non-destructive testing
OH&S	Occupational Health and Safety
PLH	Power Line Hazards
PPE	personal protective equipment
SWL	safe working load
WHMIS	Workplace Hazardous Materials Information System
WLL	working load limit

APPENDIX D BLOCK AND TASK WEIGHTING

BLOCK A COMMON OCCUPATIONAL SKILLS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	NV	15	NV	ND	25	5	10	11	15	10	NV	NV	ND	13%

Task 1 Performs safety-related functions.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	50	NV	ND	60	30	50	55	65	60	NV	NV	ND	53%

Task 2 Contributes to workplace organization.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	50	NV	ND	40	70	50	45	35	40	NV	NV	ND	47%

BLOCK B CRANE INSPECTION AND MAINTENANCE

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	NV	25	NV	ND	15	35	15	18	20	15	NV	NV	ND	20%

Task 3 Performs pre-operational checks and regular inspections.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	50	NV	ND	40	60	60	46	45	60	NV	NV	ND	51%

Task 4 Performs continual checks.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	30	NV	ND	40	30	20	33	45	30	NV	NV	ND	33%

Task 5 Performs minor crane maintenance.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	20	NV	ND	20	10	20	21	10	10	NV	NV	ND	16%

BLOCK C CRANE SET-UP, HOISTING CALCULATIONS AND LIFT PLANNING

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	NV	25	NV	ND	10	15	25	25	25	20	NV	NV	ND	21%

Task 6 Participates in tower crane assembly, disassembly and transportation.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	70	NV	ND	70	10	50	49	50	0	NV	NV	ND	43%

Task 7 Plans lifts.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	30	NV	ND	30	90	50	51	50	100	NV	NV	ND	57%

BLOCK D RIGGING

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	NV	15	NV	ND	10	10	10	20	20	15	NV	NV	ND	14%

Task 8 Inspects and maintains rigging equipment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	50	NV	ND	0	30	40	58	50	25	NV	NV	ND	36%

Task 9 Manages rigging.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	50	NV	ND	100	70	60	42	50	75	NV	NV	ND	64%

BLOCK E CRANE OPERATIONS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	NV	20	NV	ND	40	35	40	26	20	40	NV	NV	ND	32%

Task 10 Performs pre-lift (warm-up) activities.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	10	NV	ND	30	40	10	20	15	15	NV	NV	ND	20%

Task 11 Operates tower cranes.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	55	NV	ND	35	30	30	28	40	35	NV	NV	ND	36%

Task 12 Climbs (raises) tower cranes.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	15	NV	ND	10	15	20	16	15	15	NV	NV	ND	15%

Task 13 Performs specialty tower crane operations.

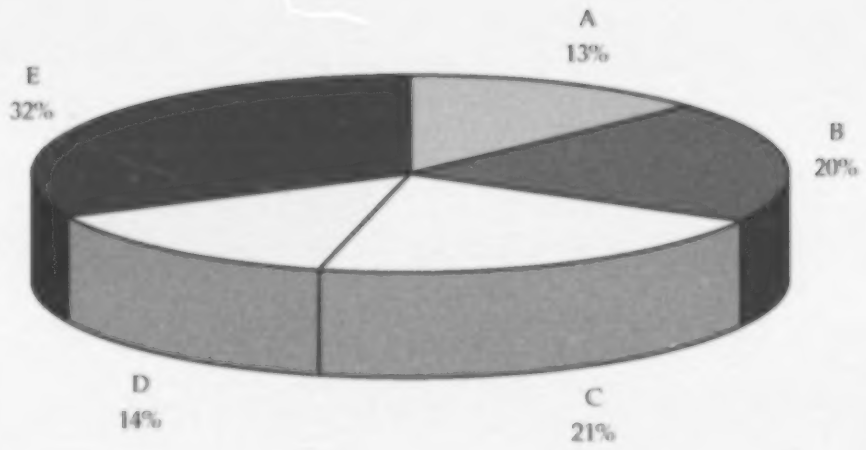
	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	15	NV	ND	15	10	20	23	10	25	NV	NV	ND	17%

Task 14 Shuts down and secures tower cranes.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	5	NV	ND	10	5	20	13	20	10	NV	NV	ND	12%

APPENDIX E

PIE CHART*



TITLES OF BLOCKS

BLOCK A	Common Occupational Skills	BLOCK D	Rigging
BLOCK B	Crane Inspection and Maintenance	BLOCK E	Crane Operations
BLOCK C	Crane Set-up, Hoisting Calculations and Lift Planning		

*Average percentage of the total number of questions on an interprovincial examination, assigned to assess each block of the analysis, as derived from the collective input from workers within the occupation from all areas of Canada. Interprovincial examinations typically have from 100 to 150 multiple-choice questions.

APPENDIX F

TASK PROFILE CHART — Tower Crane Operator

BLOCKS	TASKS	SUB-TASKS				
A - COMMON OCCUPATIONAL SKILLS	1. Performs safety-related functions.	1.01 Uses personal protective equipment (PPE) and safety equipment.	1.02 Maintains safe work environment.			
	2. Contributes to workplace organization.	2.01 Communicates with others.	2.02 Uses documentation.			
B - CRANE INSPECTION AND MAINTENANCE	3. Performs pre-operational checks and regular inspections.	3.01 Inspects structural components.	3.02 Inspects mechanical components.	3.03 Inspects lines and wire ropes.	3.04 Inspects hydraulic system components.	3.05 Inspects electrical system components.
		3.06 Inspects support components.	3.07 Inspects track travel components.	3.08 Inspects cab components.	3.09 Inspects safety and access components.	3.10 Completes inspection documentation.
	4. Performs continual checks.	4.01 Monitors site conditions.	4.02 Monitors lines and wire ropes.	4.03 Monitors equipment performance and conditions.	4.04 Monitors structural and support components.	
	5. Performs minor crane maintenance.	5.01 Maintains mechanical components.	5.02 Lubricates wire ropes and crane components.			

BLOCKS	TASKS	SUB-TASKS			
C - CRANE SET-UP, HOISTING CALCULATIONS AND LIFT PLANNING	6. Participates in tower crane assembly, disassembly and transportation.	6.01 Participates in crane assembly.	6.02 Participates in crane disassembly.	6.03 Transports self-erecting tower crane. (NOT COMMON CORE)	6.04 Participates in assembly and disassembly of self-erecting tower cranes. (NOT COMMON CORE)
	7. Plans lifts.	7.01 Interprets load charts.	7.02 Plans work procedures.	7.03 Prepares for specialty lifts.	
D - RIGGING	8. Inspects and maintains rigging equipment.	8.01 Identifies deficiencies in slings and hardware.	8.02 Lubricates slings and hardware.	8.03 Stores rigging equipment.	
	9. Manages rigging.	9.01 Selects required rigging equipment.	9.02 Rigs load.	9.03 Monitors rigging.	
E - CRANE OPERATIONS	10. Performs pre-lift (warm-up) activities.	10.01 Performs function test.	10.02 Confirms limits.		
	11. Operates tower cranes.	11.01 Trolleys carriage.	11.02 Booms (luffs) up and down.	11.03 Swings (slews) jib.	11.04 Hoists load.
		11.05 Travels crane.	11.06 Performs functions simultaneously.		
	12. Climbs (raises) tower cranes.	12.01 Performs bottom-climbing procedures.	12.02 Performs top-climbing procedures.		

BLOCKS	TASKS	SUB-TASKS		
	13. Performs specialty tower crane operations.	13.01 Participates in multi-crane lifts.	13.02 Operates in multi-crane site.	13.03 Hoists personnel.
	14. Shuts down and secures tower cranes.	14.01 Secures crane while leaving controls.	14.02 Secures crane while unattended.	14.03 Secures crane for extended periods.